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ROBERTS MLOTKOWSKI SAFRAN & COLE, P.C. Intellectual Property Department P.O. Box 10064 MCLEAN, VA 22102-8064			EXAMINER	
			MERKLING, MATTHEW J	
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/596,616

Filing Date: June 19, 2006

Appellant(s): KAEDING ET AL.

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David S. Safran  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 9/7/2010 appealing from the Office action mailed 4/1/2010.

**(1) Real Party in Interest**

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 13-16 and 18-21 are rejected and pending.

**(4) Status of Amendments After Final**

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN

REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

**(7) Claims Appendix**

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

**(8) Evidence Relied Upon**

US 6,936,238	SENNOUN ET AL.	8-2005
US 2002/0114747	MARCHAND ET AL.	8-2002
US 6,413,479	KUDO ET AL.	7-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 13-15 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sennoun et al. (US 6,936,238) in view of Marchand et al. (US 2002/0114747).

**Regarding claims 13 and 18,** Sennoun discloses a reformer and method for converting fuel and oxidant into reformat, comprising:

an oxidation zone (90) connected to a supply of fuel (12) and a supply of oxidant (air, 18) and in which the fuel and oxidant are formed into an oxidized mixture (after being oxidized in oxidation zone 90);

a reforming zone (96), and an injection and mixture forming zone (38) between the oxidation zone and the reforming zone (see Fig. 3 which discloses such an arrangement) to which at least a portion of the oxidized mixture from the oxidation zone is mixed with an injected supply (via injector 59) of additional fuel (col. 4 lines 55-62) and from which

the mixture with the additional fuel is supplied to the reforming zone upon an at least partial oxidation of the fuel (fuel is partially oxidized in zone 94 and reformed in zone 96, col. 6 lines 40-53);

wherein the reforming zone is connected to a source of heat (such as the oxidation zone 90, which is in a heat exchange relationship with the reforming zone 96).

Sennoun teaches a method and apparatus in which an oxidation zone (90) is utilized during startup to quickly heat a reforming zone (96). Sennoun teaches that the heat transfer from the oxidation zone to the reforming zone is partially done indirectly through the apparatus wall (see Fig. 3 where oxidation zone 90 is separated from reforming zone 94 by a heat conducting wall which is not labeled). However, Sennoun does not teach an apparatus or method in which a portion of the gas mixture bypasses the injection and mixture forming zone (38).

Marchand also discloses a method of starting up a reformer (see paragraph 109).

Marchand teaches a method and apparatus in which the startup/heatup of the reforming catalyst is done by direct heat exchange in order to speed the heatup time of the catalyst and not be bound by the specific heat transfer capacity of a reactant tube (paragraph 109). In other words, Marchand teaches that direct heat exchange of the catalyst is preferable to indirect heat exchange (such as through a heat conducting wall).

As such, it would have been obvious to one of ordinary skill in the art to provide a direct path from the first oxidation stage (90) of Sennoun to the reforming zone (96) of Sennoun (as suggested by Marchand) in order to provide a faster heatup of the catalyst due to a the direct heat exchange and one that is not bound by the specific heat transfer

capacity of the apparatus walls. Such a configuration would provide for a passage for the mixed gas stream to bypass the injection and mixture forming zone and flow directly into the reforming zone.

**Regarding claims 14 and 19,** Sennoun further discloses the source of heat is an exothermic oxidation produced within the oxidation zone (see col. 2 lines 35-42 which discloses that the heat from the oxidation zone/first stage is transferred to the second stage/reforming zone).

**Regarding claims 15 and 20,** Sennoun further discloses the reforming zone is connected to an oxidant supply which supplies additional oxidant to the reforming zone (oxidant supply 61 is connected to the reforming zone 96 and supplies additional oxidant to it, see Fig. 3 and col. 4 lines 55-63).

**Regarding claim 21,** Sennoun further discloses the use of a liquid fuel (which is injected through injector 59) and will inherently be at least partially evaporated by thermal energy of the gas mixture delivered to the injection and mixing zone from the oxidation zone.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sennoun et al. (US 6,936,238) in view of Marchand et al. (US 2002/0114747) as applied to claim 13 above, and further in view of Kudo et al. (US 6,413,479).

**Regarding claim 16,** Sennoun discloses a tubular structure which discloses the oxidation zone and the reforming zone in close proximity to each other such that thermal energy is transferred from the oxidation zone to the reforming zone. More specifically,

Sennoun teaches an apparatus where the oxidation zone (90) comprises at least one pipe which surrounds the reforming zone (96, see Fig. 3). However, Sennoun does not explicitly disclose a structure where the oxidation zone comprises at least one pipe which is arranged within the reforming zone.

Kudo also discloses an apparatus for which fuel is converted into a reformat (see abstract).

Kudo teaches an apparatus (Fig. 1) in which an oxidation zone (1) comprises at least one pipe which is arranged within the reforming zone (2). Kudo teaches such an arrangement in order to facilitate heat transfer from the oxidation zone to the reforming zone (col. 5 lines 31-34).

As such, reversing the configuration of Sennoun, such that the oxidation zone comprises at least one pipe which is arranged within the reforming zone (as taught by Kudo), would amount to nothing more than a simple substitution of one known element for another to yield an entirely predictable solution and would have been obvious to one of ordinary skill in the art at the time of the invention.

#### **(10) Response to Argument**

On pages 3 and 4, Appellant argues that neither Sennoun or Marchand teach a bypass passage to allow the mixed gas stream to pass directly from the oxidation zone to the reforming zone. The examiner respectfully disagrees with this argument. More specifically, Appellant states on page 3:

*“However, it is submitted that the Examiner has over-generalized the teachings of Marchand, and in doing so, he has mischaracterized what this reference might suggest to one of ordinary skill. Moreover, since Marchand does not teach use of a bypass, the*

*Examiner has failed to meet his initial burden of establishing a prima facie case of obviousness because the Examiner has provided no explanation as to why Machand's teaching would lead one of ordinary skill to use a bypass in a way that neither applied reference does, and especially since direct heat exchange already occurs in the device of Sennoun without the use of a bypass (see, for example, column 5, lines 20-23 and the last sentence of the second full paragraph). That is, where is there a recognition by either Sennoun or Marchand that a bypass would provide a better result than the direct heat exchange already present in Sennoun's device?"*

The teachings of Sennoun and Marchand do indeed provide one of ordinary skill in the art the information to arrive at the claimed invention. Sennoun does teach a method of direct heating of the catalyst (as stated in the above excerpt from the Appeal Brief). Sennoun teaches the heatup of the catalyst 96 by indirect heat exchange (through the wall that divides the steam reformer 96 and the combustion zone 90) and direct heat exchange (by gas flowing through catalyst 94 and into reformer 96). Furthermore, Marchand teaches the benefits of direct heat exchange as opposed to indirect heat exchange (as discussed in the rejection above, see paragraph 109). As such, it is the examiner's position that such teachings would lead one of ordinary skill in the art to eliminate the indirect heating of Sennoun and provide direct heating, as direct heating is beneficial (as taught by Marchand). In other words, one of ordinary skill would lead the combustion exhaust gas from combustion zone 90 DIRECTLY into the reforming catalyst 96 by going through the indirect heat exchange wall that separates the two zones. Such a modification would provide additional DIRECT heating of the reforming catalyst 96 and provide a faster heatup of the catalyst. To put it yet another way... direct heating is a known in the art to be a faster method of heating up a catalyst (as taught by Marchand), and modifying Sennoun to

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allow combustion gas to flow directly into the reforming catalyst 96 from combustion zone 90 (thereby bypassing the mixing zone) would have been obvious to one of ordinary skill in the art at the time of the invention to provide the fastest heatup possible of catalyst 96.

Furthermore, Appellant's arguments on the bottom of page 3 and beginning of page 4 are directed only at Marchand and do not take into account that the rejection is based on Sennoun modified by Marchand, not Marchand alone.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Matthew J Merkling/

Examiner, Art Unit 1723

Conferees:

/Ula C Ruddock/  
Supervisory Patent Examiner, Art Unit 1795

/Anthony McFarlane/